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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/812,276	03/20/2001	Michio Horiuchi	072-01	2361

7590 10/21/2002

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EXAMINER

OWENS, DOUGLAS W

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 10/21/2002

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/812,276

Applicant(s)

HORIUCHI ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-22 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-22 and 27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 5,892,271 to Takeda et al. in view of US patent No. 6,060,771 to Tomikawa et al.

Regarding claim 20, Takeda et al. teaches a semiconductor device, comprising:
a resin member of a predetermined thickness (19);
a semiconductor element (1) having an active surface facing downward;
metal interconnections (6, 13) formed on the bottom surface of the resin member;
and
connection terminals (2, 3) extending downward from the active surface of the semiconductor element and having bottom ends connected to top surfaces of said metal interconnections (See for example, the connections in Fig. 8).

Takeda et al. further teaches a resin coating over the bottom side of the semiconductor element to seal the electrode surface of the element inside the coating (Col. 7, lines 9-13) so that the back surface of the chip is exposed. Takeda et al. does not teach resin on the sides of the chip, such that the chip is enclosed.

Tomikawa et al. teaches a semiconductor device wherein the semiconductor element (1) is sealed inside the resin member (8) and wherein the element has a back surface exposed at a top surface of the resin member (Fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Tomikawa et al. into the device taught by Takeda et al. since it is desirable to protect the chip from the detrimental effects of the environment, such as moisture and debris.

Regarding claim 21, the combined teaching of Takeda et al. and Tomikawa et al. disclose a device wherein the back surface of the semiconductor element and the top surface of the resin member form the same plane.

Regarding claim 22, the proposed device of Takeda et al. and Tomikawa et al. discloses a semiconductor device, as recited above, further disclosing wherein the device is provided with a solder resist layer covering the entire bottom surface of said resin member including said metal interconnections, passing through said solder resist layer, and projecting downward (see, for example, Takeda et al., Fig. 8 (15) and Col. 7, lines 13-17).

3. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeda et al. and Tomikawa et al. as applied to claim 20 above, and further in view of US patent No. 6,023,096 to Hotta et al.

Neither Takeda et al. nor Tomikawa et al. teach a device, wherein an inorganic filler is dispersed in the resin member. Hotta et al. teaches a semiconductor device, wherein an inorganic filler is dispersed in the resin member (Col. 5, lines 54-65). It

would have been obvious to one of ordinary skill in the art to incorporate the teaching of Hotta et al. into the device taught by Takeda et al. and Tomikawa et al. since it is desirable to protect the chip from the effects of differential thermal expansion.

Response to Arguments

4. Applicant's arguments filed August 5, 2002 have been fully considered but they are not persuasive.

The applicant argues that the claimed invention is not obvious in view of Takeda et al. and Tomikawa et al. because the claimed invention does not require a wiring substrate. There is nothing in the claims to preclude a wiring substrate from being included in the device.

The applicant further argues that the cited references do not teach metal interconnections. Takeda et al. teaches electrodes 6 and solder bumps 13. The electrodes are directly connected to the copper fill in hole 14. Solder bump 13 is connected to the electrode. Solder is known to comprise fusible alloys, such as the metals tin or lead. Additionally, solder is used for join metal parts and it can be reasonably assumed that the electrode 6 is metal. Accordingly, Takeda et al. at least teaches that the solder bump 13 is metal, as well as implies that the electrode 6 is metal. The purpose of the structure is to electrically interconnect the chip with outside devices, so Takeda et al. does indeed teach metal interconnections.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

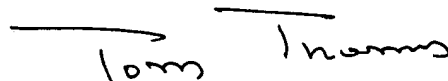
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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive style with a horizontal line above the first name.

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

DWO
October 17, 2002